Agrinovo

# AGRINOVO-EC-110

## Digital Conductivity & Salinity Sensor

## 1. Overview

The AGRINOVO-EC-110 is a high-range digital conductivity and salinity sensor for industrial water, brine, and marine environments. A single PTFE-housed probe with a K=10.0 two-graphite electrode measures conductivity up to 200 mS/cm and salinity up to 100 ppt, with simultaneous TDS and temperature output, all delivered over RS485 Modbus-RTU.

### Key Features

- Conductivity: 0 to 200 mS/cm
- Salinity: 0 to 100 ppt
- TDS in ppm
- Accuracy: ±1.5% FS
- K=10.0 graphite electrode
- PTFE housing
- RS485 Modbus-RTU output
- Low power: ≤0.5 W

### Applications

- Industrial brine and salt processing
- Aquaculture, marine, and seawater
- Desalination plants
- Wastewater and environmental monitoring
- Food processing, fermentation, dye, plating
- Chemical and process water

## 2. Specifications

| Parameter | Specification |
|---|---|
| **Conductivity Range** | 0 to 200,000 µS/cm (0 to 200 mS/cm) |
| **Salinity Range** | 0 to 100 ppt |
| **TDS Output** | ppm (composition dependent) |
| **Accuracy** | ±1.5% FS |
| **Temperature Range** | 0 to 60°C |
| **Temperature Compensation** | Automatic |
| **Operating Humidity** | ≤85% RH |
| **Power Consumption** | ≤0.5 W |
| **Electrode Constant** | K = 10.0 |
| **Electrode Material** | Two-graphite |
| **Housing Material** | PTFE |
| **Output** | RS485 Modbus-RTU |
| **Supply Voltage** | 12-24 VDC |

## 3. Wiring

| Wire Color | Function | Description |
|---|---|---|
| **Red** | V+ | Power Supply |
| **Black** | GND | Power Ground |
| **Yellow** | RS485-A | Data + |
| **Green** | RS485-B | Data - |

## 4. Communication Settings

| Parameter | Value |
|---|---|
| **Protocol** | Modbus-RTU |
| **Baud Rate** | 9600 bps |
| **Data Bits** | 8 |
| **Parity** | None |
| **Stop Bits** | 1 |
| **Default Address** | 0x01 |

## 5. Register Map

### Measurement Registers (Function 0x03)

| Address | Description | Scaling | Range |
|---|---|---|---|
| 0x0000 | Conductivity | Value × 10 → µS/cm | 0 to 200,000 µS/cm |
| 0x0001 | Temperature | Value ÷ 10 → °C | 0 to 60°C |
| 0x0002 | TDS | Value × 10 → ppm | composition dependent |
| 0x0003 | Salinity | Value ÷ 10 → ppt | 0 to 100 ppt |

The salinity-to-TDS ratio depends on water composition. For NaCl-dominant water (seawater, marine aquaculture, industrial brine), the ratio is typically 1.5 to 2.0.

### Configuration Registers (Function 0x06)

| Address | Description | Range / Notes |
|---|---|---|
| 0x0000 | Slave Address | 0x01 to 0xFE |
| 0x0004 | Slope | Value × 1000 (default: 1000) |

## 6. Reading Data

Read 4 registers from 0x0000:

```
Request:  01 03 00 00 00 04 [CRC]
Response: 01 03 08 00 1A 00 BF 00 0D 00 02 [CRC]
```

### Decoding (tap water example):

| Register | Hex | Decimal | Scaling | Result |
|---|---|---|---|---|
| Conductivity | 0x001A | 26 | × 10 | **260 µS/cm** |
| Temperature | 0x00BF | 191 | ÷ 10 | **19.1°C** |
| TDS | 0x000D | 13 | × 10 | **130 ppm** |
| Salinity | 0x0002 | 2 | ÷ 10 | **0.2 ppt** |

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## 7. Address Configuration

### Change Address (0x01 to 0x02)

Write to register 0x0000:

```
01 06 00 00 00 02 [CRC]
```

### Broadcast Discovery

Use address 0xFE with only one device on the bus.

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## 8. Calibration

### Slope Adjustment

The slope register at 0x0004 trims the sensor against a known reference standard. Slope is stored as `value × 1000`. To set a slope of 1.200, write 1200 (0x04B0):

```
01 06 00 04 04 B0 [CRC]
```

Default slope is 1.000 (raw value 1000).

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## 9. Installation Notes

### Sensor Placement

- Electrode faces flow direction
- Fully submerged in water
- Avoid dead space and air pockets
- Use bypass mounting for stable flow

### Cable and Maintenance

- Keep electrode surface clean
- Avoid bare hand contact and oils
- Route signal cable separate from power lines
- Do not extend the factory cable